BY ORDER OF THE COMMANDER
AEROSPACE MAINTENANCE AND
REGENERATION CENTER

AMARC INSTRUCTION 21-121

20 AUGUST 1999

Maintenance

PROCESSING AIRCRAFT BATTERIES

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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OPR: AMARC/LAA (M. Flanagan)
Certified by: AMARC/LA (P.J. Mulloy)
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This instruction implements Air Force Policy Directive (AFPD) 21-1, *Managing Aerospace Equipment Maintenance*. It establishes procedures and assigns responsibilities for processing lead-acid and nickel-cadmium (ni-cad) batteries and applies to the Aircraft Management (LA) and Logistics (LG) Directorates.

SUMMARY OF CHANGES. Changes are indicated with an * (asterisk); and provides the neutralization procedures for the batteries and the disposition of ni-cad batteries. Adds the Environmental Protection Committee guidance for universal waste disposal and the DM Intranet site for the committee's publications.

1. GENERAL.

1.1. The safety requirements and all warnings and cautions in 8D2-Series technical orders (TO); Navy Air (NAVAIR) 17-15BAD-1, *Naval Aircraft and Naval Aircraft Support Equipment Storage Batteries;* and Air Force Occupational Safety and Health (AFOSH) standards will be strictly followed for handling, service and storage of all types of aircraft batteries.

1.2. Batteries removed from incoming aircraft will have the fittings and attachments that are not a part of the battery, placed in a container and secured in the aircraft battery compartment.

1.3. Lead-acid and ni-cad batteries will not be mixed; each type will be transported in separate trailers and stored separately.

1.4. Battery storage and disposal will follow the guidelines established in the *Davis-Monthan AFB Hazardous Waste Management Plan* (HWMP) available at website:

is-48-3.dm.af.mil/epc/HW/index.htm.

2. RESPONSIBILITIES AND PROCEDURES:

2.1. The Process In Division, Receiving Branch (LAIR) will remove and process lead-acid and ni-cad batteries from all aircraft being processed into storage:

2.1.1. Ensure vent plugs are firmly secured to prevent electrolyte leakage and covers are installed.

2.1.2. Condition tag the batteries with DD Forms 1577-2, **Unserviceable (Reparable) Tag Materiel**, with the following entries:

2.1.2.1. National stock number (NSN) and part number.

2.1.2.2. Nomenclature.

2.1.2.3. Aircraft mission design and series (MDS) and bureau or serial number.

2.1.2.4. Condition code "E."

2.1.2.5. AMARC type and identification number.

2.1.3. Place the batteries on pallets on trailers, in an upright position, in a single-layer and take to the Specialist Support Division (LAS), Avionics Branch (LASA), Battery Shop (building 7221 for lead-acid batteries, and building 7223 for ni-cad batteries) within 5 workdays after removal. **NOTE.** Lead-acid batteries must be transported separately; silver-zinc and ni-cad batteries can be transported together.

2.1.4. Report/record aircraft asset visibility for lead-acid and ni-cad battery removal using reason why code "K," on AMARC Form 22**, Components/Items Missing and/or Removed from Aircraft**, as an update for the aircraft inventory shortage. Distribute three copies of the AMARC Form 22 IAW AMARCI 21-119, *Receipt/Processing-In Aerospace Vehicles & Related Storage Assets*:

2.1.4.1. Copies one and two to the LASA, Battery Shop.

2.1.4.2. Copy three retained by LAIR.

2.2. The LASA, Battery Shop will:

2.2.1. Maintain a record of batteries, by branch of service, type and quantity on hand.

2.2.1.1. Report the NSN, part number, MDS, and owning service (of aircraft from which battery was removed) to the Logistics Directorate, Logistics Support Division, Special Assets Storage Branch (LGLM) the first week of each month (Figure 1).

2.2.1.2. Send an information copy to the Forward Supply Management Branch (LGSC).

2.2.1.3. Send a request for aircraft batteries to LGSC as needed for aircraft in work. The request will be made sufficiently in advance so serviced batteries are available when needed.

2.2.1.4. Service batteries as required for installation on aircraft.

Figure 1. Sample Letter for Lead-Acid Batteries Disposition.

MEMORANDUM FOR AMARC/LGLM (Date)

SUBJECT: Request Disposition of Batteries (Owning Service, i.e. Navy, AF, etc.)

FROM: AMARC/LASA

Request disposition instructions are provided for subject batteries received during the month of _____. Refer to AMARC Instruction 21-121, *Processing Aircraft Batteries*.

NSN	QTY	PART NBR/TYPE	M

(Name of Supervisor/Foreman)

cc: LGSC

2.2.2. Lead-Acid Batteries. Receive, inspect and process all lead-acid batteries:

2.2.2.1. Select, store, and maintain the quantity or type of lead-acid batteries needed to support aircraft withdrawal projects. (See paragraph 2.3.2.)

2.2.2.2. Inspect case for damage, cracks, and electrolyte leaks. If leaks are detected, neutralize the acid IAW technical data and paragraph 3, this instruction. Enter the type acid, date and quantity disposed into a log for annual hazardous waste disposal reporting to 355th Civil Engineering Squadron/Environmental Quality Flight (355 CES/CEVC). If a battery is damaged, cracked, leaks, or is otherwise found to be defective from crushing, exploding, fusing of cells and case or corrosion, process the battery to Defense Reutilization and Marketing Office (DRMO) according to the instructions in the HWMP.

2.2.2.3. Batteries that are not required for withdrawal projects or any other AMARC function, are processed to DRMO using the procedures in HWMP IAW with the current Interservice Support Agreement (ISA) and AFMCR 65-9, *Removal of Parts from Aircraft Arriving in Storage at the Aerospace Maintenance and Regeneration Center*.

2.2.2.4. Process lead-acid batteries to DRMO:

2.2.2.4.1. Drain, and neutralize acid for crack and leaking batteries. Neutralize sulfuric acid IAW applicable technical data as described in paragraph 3.

2.2.2.4.2. Ensure vent caps are tight.

2.2.2.4.3. Change AMARC Form 22 reason why code to "K."

2.2.2.4.4. Condition-tag the battery as "condemned."

2.2.2.4.5. Prepare the DRMO transfer document IAW AFMAN 23-110, Volume II, Part 13, *Standard Base Supply Customer's Procedures*, Chapter 4.

2.2.3. Ni-cad Batteries . Receive, inspect, and process all ni-cad batteries in accordance with (IAW) 8D2-Series TOs and NAVAIR 17-15BAD-1 as follows:

2.2.3.1. Discharge and neutralize any obviously leaking or cracked batteries following the procedures in paragraph 4, this instruction. If they are burned, cracked or exploded, do not neutralize, get a document number for turn-in action from an LGS inspector and enter the document number on the AMARC Form 22.

2.2.3.1.1. Spray the top of defective cells with red paint.

2.2.3.1.2. Discharge and equalize cells, then install a shorting device.

2.2.3.2. IAW applicable technical data disassemble, clean, reassemble, service and maintain only those batteries that are to be returned to aircraft for withdrawal projects or are used for support equipment installation:

2.2.3.3. Completely recharge and service, capacity check, then discharge.

2.2.3.4. Clean case, exterior of cells, interconnectors and hardware. Make sure vent caps are tight.

2.2.3.5. Turn in batteries with the AMARC Form 22 to Logistics Support Division, Special Assets Branch (LGLM) for storage and to update the aircraft asset visibility record.

2.2.4. Ensure all batteries for shipment are prepared IAW applicable technical data.

2.2.4.1. Batteries will have a Material Safety Data Sheet (MSDS) including the shipping data and proper serviceability tag with the applicable M or P inspector stamp. **NOTE:** The LASA technical specialist will certify for shipment of batteries via flyaway aircraft.

2.2.4.2. Fully charge lead-acid batteries. Do not remove electrolyte from reparable or serviceable batteries. Vent plugs will be secured firmly in place to avoid spilling electrolyte.

2.3. LGSC will:

2.3.1. Obtain a C03ALIST for each aircraft as it is placed into work. The listing will show all the aircraft assets in storage for the requested aircraft identification (ID) number.

2.3.2. Advise LASA, Battery Shop, by letter, of the quantity batteries stored and maintained to support aircraft withdrawal project so LASA may request batteries as needed from LGSC.

2.3.3. If insufficient batteries are on hand, order the quantity needed against the project or establish an adjusted stock level IAW AFMAN 23-110, Volume II, Part 2.

2.3.4. As battery issues are requested, review the C03ALIST to see if the batteries are in storage for the requested aircraft; and request LGLM process a transfer back to the aircraft in work.

2.3.5. If the C03ALIST does not show batteries in storage for the aircraft, request LGLM process a query to determine if there are excess storage assets available for transfer to the aircraft.

2.3.6. Pick-up batteries from LGLM storage personnel and deliver to LASA, Battery Shop for servicing.

2.3.7. Review production work orders (PWO), the workload projections and the monthly maintenance plan to determine the quantity and type of batteries needed to support aircraft withdrawal projects. Workload projections must be considered to ensure the right types of batteries are available.

2.4. LGLM will update the storage asset and visibility records IAW AMARCI 21-119, *Receipt/Processing-In Aerospace Vehicles and Related Storage Assets,* and store the batteries until disposition instructions are received.

2.5. The Packaging Branch (LGLP) will package all batteries and prepare Hazard Certification for military air, commercial air, rail, surface, water, and etc. shipment IAW AFJMAN 24-204, *Preparing Hazardous Materials for Military Air Shipments;* International Civil Aviation Organization (IATA), International Civil Aviation Organization (ICAO) technical instructions, Title 49 Code of Federal Regulations (CFR) and other applicable directives for surface or commercial air shipment.

2.6. LGLM will report all Navy-owned lead-acid batteries batteries only in "E" condition by NSN, part number, and applicable data to the Navy Inventory Control Point (NICP), by message, IAW the current ISA.

2.6.1. If the Navy requires the batteries, prepare "DO NOT POST" shipping documents (paragraph 2.2.2.4.7):

2.6.1.1. Fill out a DD Form 1348-1A, **DoD Single Line Item Release/Receipt Document**.

2.6.1.2. Coordinate with the LGL to prepare batteries for shipment.

2.6.1.3. Coordinate with the LASA, Battery Shop or LGLM, warehouse personnel when batteries are in storage, to move the them to LGLP.

2.6.2. If ICP disposition is not received in 30 days, or states the batteries are not required, notify LASA, Battery Shop to transfer them to DRMO, IAW paragraph 2.2.2.4.

3. SULFURIC ACID AND LEAD-ACID BATTERY NEUTRALIZATION. Lead-acid storage batteries contain sulfuric acid that is a highly toxic and corrosive base material, which must be handled with caution. The following procedures have been approved by the Base Bioenvironmental Engineering (BEE) Flight (355 AMDS/SGBP) to neutralize and dispose of excess sulfuric acid and unserviceable battery cells. The DM Hazardous Waste Management Program directives were published by the base Environmental Protection Committee and are found at web site: /is-48-3.dm.af.mil/epc-HW/index.htm Appendix H, Waste Batteries, provides information on handling and disposing of waste batteries.

CAUTION. During the neutralization process, the individual will wear a face shield, rubber gloves and rubber apron to prevent injury from the chemicals.

3.1. Mix a solution of one cup of bicarbonate soda for every gallon of water in a vat or sink.

3.2. Empty sulfuric acid from the battery into the bicarbonate soda and water mixture.

3.3. Place the battery into the solution, ensuring the battery cells fill with the solution.

3.4. Add water until the solution level is approximately 2 inches above the batteries.

3.5. Spread additional bicarbonate soda over the tops of the batteries.

3.6. Let stand for 24 hours.

3.7. Test the solution with hydrion papers. Add more bicarbonate soda to the solution if necessary to reach a pH reading of 7.

3.8. When the pH level of 7 is reached, the vat or sink and the batteries may be drained into the sanitary sewer system.

3.9. Place batteries upside down to drain and dry.

3.10. After neutralization is completed, record the amount of acid neutralized for annual reporting to 355 CES/CEVC and dispose of the batteries according to paragraph 2.2.2.4.

4. POTASSIUM HYDROXIDE AND NICKEL-CADMIUM BATTERY CELL NEU TRALIZATION. Ni-cad storage battery cells contain potassium hydroxide electrolyte which is a highly toxic and corrosive base material that must be handled with caution. BEE has approved the following procedures to neutralize and dispose unserviceable/condemned, i.e., cracked or leaking potassium hydroxide and ni-cad battery cells.

CAUTION. During the neutralization process, the individual will wear a face shield, rubber gloves and a rubber apron to prevent injury from the chemicals.

4.1. Mix a solution of one gallon of distilled vinegar for every 10 gallons of water in a sink or vat large enough to hold the batteries to be neutralized.

4.2. Empty the electrolyte from the cells into the solution of vinegar and water.

4.3. Place the battery into the solution, ensure the cells fill with solution and lay each battery flat on its side.

4.4. The solution must be approximately one inch above the cells.

4.5. Let the batteries remain in the solution for 24 hours.

4.6. Test the solution pH using hydrion papers. Add additional vinegar to the solution to ensure pH 7 factor is reached.

4.7. When a pH reading of approximately 7 is reached, the solution is sufficiently neutralized and may be drained into the sanitary sewer system.

4.8. Empty the battery cells and place them upside down in the sink to drain and dry.

4.9. After neutralization is completed, the neutralized batteries may be disposed of through 355CES/CEV.

OFFICIAL

PATRICK J. MULLOY
Director, Aircraft Management